

REMARKS

This paper is being provided in response to the February 6, 2007 Office Action for the above-referenced U.S. patent application. In this response, Applicants have amended claims 1 and 10 in order to clarify that which Applicants deem to be the invention. Applicants respectfully submit that the amendments to the claims are supported by the originally filed application.

The rejection of claims 1, 6, 10, and 15 under 35 U.S.C. 103 (a) as being unpatentable over U. S. patent number 5,901,327 to Ofek (hereinafter “Ofek”) in view of U.S. patent number 6,038,651 to VanHuben, et al. (hereinafter “VanHuben”) is hereby traversed and reconsideration thereof is respectfully requested in view of amendments to the claims provided herein.

Claim 1, as amended herein, is for a method of using a local storage device to read desired data while the data is being transferred from the local storage device to a remote storage device. The method includes, if the desired data is entirely in a cache of the local storage device, the local storage device returning the data from the cache. The cache of the local storage device is recited as containing data written to the local storage device begun after a first time and before a second time that is associated with a first chunk of data and containing data written to the local storage device begun after the second time that is associated with a second chunk of data different from the first chunk of data. After completion of all writes associated with the first chunk of data, the local storage device initiates transfer of writes associated with the first chunk of data to the remote storage device, an order of the transfer being independent of an order in

which data writes of the first chunk are provided to the local storage device. If the desired data is not entirely in the cache of the local storage device, data is read from the remote storage device to the local storage device and the local storage device merges the data from the remote storage device with data from the cache of the local storage device at the local storage device. Claim 6 depends from claim 1.

Claim 10, as amended herein, is for computer software, stored in a computer-readable medium, that reads desired data while the data is being transferred from the local storage device to a remote storage device. The software includes executable code that returns the data from the cache if the desired data is entirely in a cache of the local storage device. The cache of the local storage device contains data written to the local storage device begun after a first time and before a second time that is associated with a first chunk of data and contains data written to the local storage device begun after the second time that is associated with a second chunk of data different from the first chunk of data. After completion of all writes associated with the first chunk of data, the local storage device initiates transfer of writes associated with the first chunk of data to the remote storage device, an order of the transfer being independent of an order in which data writes of the first chunk are provided to the local storage device. The software also includes executable code that reads data from the remote storage device to the local storage device and merges the data from the remote storage device with data from the cache of the local storage device at the local storage device if the desired data is not entirely in the cache of the local storage device. Claim 15 depends from claim 10.

The present claimed invention reads data from a remote storage device while the data is being transferred from a local storage device to the remote storage device by first checking if the data is in the cache of the local storage device. If the data is available in the cache of the local storage device, the data being read from the remote storage device is obtained from the cache of the local storage device. The cache of the local storage device contains data written to the local storage device begun after a first time and before a second time that is associated with a first chunk of data and contains data written to the local storage device begun after the second time that is associated with a second chunk of data different from the first chunk of data. After completion of all writes associated with the first chunk of data, the local storage device initiates transfer of writes associated with the first chunk of data to the remote storage device, an order of the transfer being independent of an order in which data writes of the first chunk are provided to the local storage device. Thus, the present claimed invention reads data being stored on the remote storage device without having to always obtain the data from the remote storage device even though the transfer mechanism between the local and remote storage devices is relatively complex.

Ofek discloses a system and method for automatically providing and maintaining a copy or mirror of data stored at a location remote from the main or primary storage device. Data is retrieved from a remote device through a host data processing system. The host 12 writes data to and reads data from the primary data storage system 14. The host central processing unit 212 can also be provided with host remote mirroring software 213 so that the data processing system can be configured and monitored from a user interface of the host central processing unit. Host application programs can also interface with the remote mirroring facility of the data storage

systems 214, 246 via the host remote mirroring software 213. During a read access, the channel adapter accesses the cache. If the data requested by the host is not found in the cache, the data is fetched by a disk adapter from the disk storage in the data storage system and loaded into the cache. Column 14 beginning at line 43 of Ofek discloses that, under the abnormal condition of the data being entirely absent from the data storage system due to a disk drive failure, requests for data access to a primary volume (R1) can be satisfied by obtaining the requested data from the secondary volume (R2) in the remote data store system.

VanHuben discloses a remote resource management system for managing resources in a symmetrical multiprocessing comprising a plurality of clusters of symmetric multiprocessors having interfaces between cluster nodes of the symmetric multiprocessor system. Each cluster of the system has a local interface and interface controller. There are one or more remote storage controllers each having its local interface controller, and a local-to-remote data bus. The remote resource manager manages the interface between two clusters of symmetric multiprocessors each of which clusters has a plurality of processors, a shared cache memory, a plurality of I/O adapters and a main memory accessible from the cluster.

Applicants respectfully submit that neither Ofek, nor VanHuben, nor any combination thereof show, teach, or suggest features recited in independent claims 1 and 10, including the feature of the cache of the local storage device containing data written to the local storage device begun after a first time and before a second time that is associated with a first chunk of data and containing data written to the local storage device begun after the second time that is associated with a second chunk of data different from the first chunk of data where, after completion of all

writes associated with the first chunk of data, the local storage device initiates transfer of writes associated with the first chunk of data to the remote storage device, an order of the transfer being independent of an order in which data writes of the first chunk are provided to the local storage device. The transfer mechanism for each of Ofek and VanHuben appears to be much simpler and apparently involves transferring data as it is written. In contrast, the transfer mechanism of the present claimed invention allows data for a particular chuck to be transferred from the local storage device to the remote storage device in an order that is independent of the order that the data was written to the local storage device.

Accordingly, for reasons set forth above, Applicants respectfully request that this rejection be withdrawn.

The rejection of claims 2, 7-9, 11, and 16-18 under 35 U.S.C 103(a) as being unpatentable over Ofek and VanHuben in view of U.S. patent number 6,880,045 to Pong et al. (hereinafter “Pong”) is hereby traversed and reconsideration thereof is respectfully requested.

Claims 2 and 7-9 depend from claim 1, discussed above. Claims 11 and 16-18 depend from claim 10, discussed above.

The Ofek and VanHuben references are discussed above.

As set forth in the Office Action, Pong teaches prior to reading data from the remote storage device to the local storage device, creating a temporary storage device at the local storage device if there is data from the local storage device that is to be read.

Applicant respectfully submits that the deficiencies of Ofek and VanHuben with respect to claims 1 and 10, discussed above, are not overcome by the addition of the Pong reference. Accordingly, Applicant respectfully requests that this rejection be withdrawn.

The rejection of claims 3-5, and 12-14 under 35 U.S.C 103(a) as being unpatentable over Ofek, VanHuben and Pong and further in view of U.S. patent number 6,012,063 Bodnar et al. (hereinafter “Bodnar”) is hereby traversed and reconsideration thereof is respectfully requested.

Claims 3-5 depend from claim 1, discussed above. Claims 12-14 depend from claim 10, discussed above.

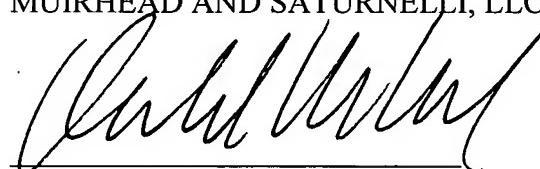
The Ofek, VanHuben and Pong references are discussed above.

As set forth in the Office Action, Bodnar teaches having a temporary storage area that is a scratch slot.

Applicant respectfully submits that the deficiencies of Ofek and VanHuben (and Pong) with respect to claims 1 and 10, discussed above, are not overcome by the addition of the Bodnar reference. Accordingly, Applicant respectfully requests that this rejection be withdrawn.

Based on the above, Applicants respectfully request that the Examiner reconsider and withdraw all outstanding rejections and objections. Favorable consideration and allowance are earnestly solicited. Should there be any questions after reviewing this paper, the Examiner is invited to contact the undersigned at 508-898-8603.

Respectfully submitted,
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May 2, 2007

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